N.A.C.A. BULLETIN

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VOL. XXIX, NO. 4 OCTOBER 15, 1947

EDITORIAL DEPARTMENT NOTE

The cost accountant's interests keep widening and it becomes necessary for him to have a working knowledge of many things other than accounting. One of these subjects concerns time studies, a field to which the passing years have brought many refinements. Since good time studies underlie a sound wage structure, it is more than ever important to understand time study technique.

W. R. WRIGHT, author of the first article in this issue of the *Bulletin*, is a Partner in Stevenson, Jordan & Harrison, Inc., having joined the staff in 1933. He graduated from the University of Michigan and spent some years in the Time Standards Division of Western Electric Co. and as an independent consultant. During the war he served as lieutenant colonel with the U. S. Army Ordinance Department.

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Although much has been written on material control, the subject never loses interest. Control through maximum and minimum limits is not always satisfactory. In these days of material shortages and uncertain prices it is necessary to have a control assuring a supply based on production needs and at the same time providing a proper inventory reserve.

B. W. KINDERMAN, author of "Controlling Material Supply and Inventories," presents his solution to this problem. He is in charge of cost accounting and production planning with DeWalt, Inc. He joined the company in 1930, served for one year in the Cost Department, and for five years in the General Accounting Department. In 1936 he was placed in charge of the Cost Department and along with this duty has been in charge of production planning and inventory control since 1940.

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Most articles dealing with trucking operations stress one or another phase of cost finding. We are happy therefore to be able to present an article in the current issue which stresses the use of costs of motor operations for managerial purposes.

ALLEN C. KAHL, author of the article on cost control for motor carriers, attended Virginia Military Institute. In 1938 he was employed as field office manager for a construction company and subsequently as accountant for the Western Maryland Railway. For the past five years he has been employed as Senior Accountant for Fairchild Aircraft Division. Mr. Kahl is also a Partner in the accounting firm of Price & Kahl in Charleston, W. Va.

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In any plan of material control, supply items are usually taken up as an afterthought, a kind of stepchild. Great care is nevertheless required in purchasing, storing, and issuing such materials in order to prevent waste. Our last article in this issue presents an approach to accounting for and controlling all kinds of special supply items.

JOHN R. HAAS, the author, is a member of the Erie Chapter, which he joined in 1938, serving in various capacities on the chapter board of directors. During 1943-44 he served as President of the Chapter. Mr. Haas presently occupies the position of Head of the Tax and Audit Section of The Hammermill Paper Co.

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OCTOBER 15, 1947

BETTER RATES THROUGH ELEMENT TIME STANDARDS

by W. R. WRIGHT,
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New York, N. Y.

WHEN WAGE incentives were first introduced into American industry, the determination of unit time values was considered so simple that the task of setting rates was handled by the foremen during their spare time. It soon developed, however, that although the foremen knew how a job should be done, they had no idea as to how long it should take, and the first figure that entered their heads was often given the workmen as the piecework price. Under this system, time values were necessarily very inconsistent. They were either too low to enable the workmen to earn a fair wage, or were so high that the management felt the earnings were out of reason and accordingly cut the rates. Even the most stupid worker, after receiving two or three rate cuts as a reward for working hard, resented that treatment and began "soldiering." Thus began a passive war between management and the workers, management endeavoring by every means possible to induce the workers to increase their output and the men gauging their pace so as not to earn over a certain wage, knowing that if they exceeded this wage, the piece rate would certainly be cut.

Early Time Studies

In 1895, at the Detroit meeting of the American Society of Mechanical Engineers, Mr. Frederick Taylor presented a paper entitled "A Piece Rate System." There were two essential features of this system; first, rates were fixed by elementary time study with a stop watch, and second, a differential piece rate was offered which consisted of two different rates for the same job—a high price per piece when the work was finished within the allowed time and a low price if it took a longer time. Since by this system of rate fixing the element of guess was replaced by scientific study of time values, the necessity for cutting rates was removed. This system, therefore, pointed the way to the removal of the greatest cause for hard feelings between management and the men, and is a landmark in the field of industrial relations.

The technique of elemental time study, however, still contained a large element of personal judgment, and therefore some time values

for a given class of work were much easier to meet than others. This was due to differences in efficiency of the operators studied, variation in the judgment of several time study men, unnecessary work that was allowed to pass unnoticed during the studies, and the use of different methods of analysis. The resulting inconsistencies in piece rates tended to decrease the respect of the workers for time study methods, since it required only a few "wild" piece rates to destroy the confidence built up by hundreds of accurate rates.

Element Time Standards

About 1920, the managements of some of the more progressive companies decided that in order to obtain the best results from any wage incentive system, a great deal more fundamental planning with respect to time values would have to be done. Time standardization organizations were, therefore, formed for the purpose of standardizing time study technique, and were instructed to develop a method of determining more consistent time values. After considerable research, it was quite generally agreed that formula construction and element standards determined from stop watch studies offered the most practicable solution to the problem of irrational incentive earnings. This technique was termed "time standardization," and the time data for a given class of work were called "element time standards."

Element time standards consist of tables, charts, formulas, and allowances by means of which the time for an operation or part of an operation may be determined without recourse to stop watch timing. The standards are evolved through the making of time, motion, and production studies of the job in question and from them reducing each operation to its elements or component parts. These elements are then studied to determine the laws of variation between the conditions for the given class of work and the time required to perform the various elements. These laws of variation are finally developed into formulas, tables, or charts from which the total time may be computed for any operation in connection with the particular class of work being studied.

Uses of Time Standards

The obvious advantages of using time study data in this way are that considerable time is saved in establishing time values by formula rather than by individual time study, that the values are

more consistent, that they can be determined from working drawings and other manufacturing information before the job is actually performed in the shop, and that a high grade, analytical time study man is not needed to apply the standard. Since a comparatively small number of representative time studies provides sufficient material from which to make a formula which will apply to an entire class of work, it is possible by use of element time standards to apply incentives to jobs for which it would be impractical to establish time values for each operation by individual time studies.

Although the establishment of rates is the most important use of element time standards, they are also used for determining manufacturing capacity, cost estimating, making tool analyses, and estimating cost reduction savings. It is evident that when the same standards are used for setting the rates as are used for estimating, the estimates can be used without fear of error. This makes planning and estimating much more accurate than is possible when the only guides are piece rates on similar operations.

Activities to be Standardized

The justification for time standards is a question of economics; that is, the cost of setting up and maintaining a given time standard must be more than recovered by the savings to be derived from the use of the time standard. Exhibit 1 shows the difference in the cost of setting piece rates from time standards and the cost of setting the same rates from individual time study and from comparison with similar piece rates which was found in a large manufacturing company making electrical equipment. The savings in nonproductive time realized are self-evident. The intangible savings due to more consistent earnings, however, were believed to be greater than the tangible savings. The comparison of earnings figures given by Exhibit 2 demonstrates this point quite forcibly. The earnings on piece rates set from individual time study fluctuate widely and the average earnings in the department are over 50 per cent above the base rate. Referring to the theoretical earnings on the element time standards, the fluctuations are comparatively small and the average earnings are 28 per cent above the base rate. It is therefore evident that the management of this company is paying too much for this work due to inaccurate time values in the piece rates. In addition, the irrational earnings have

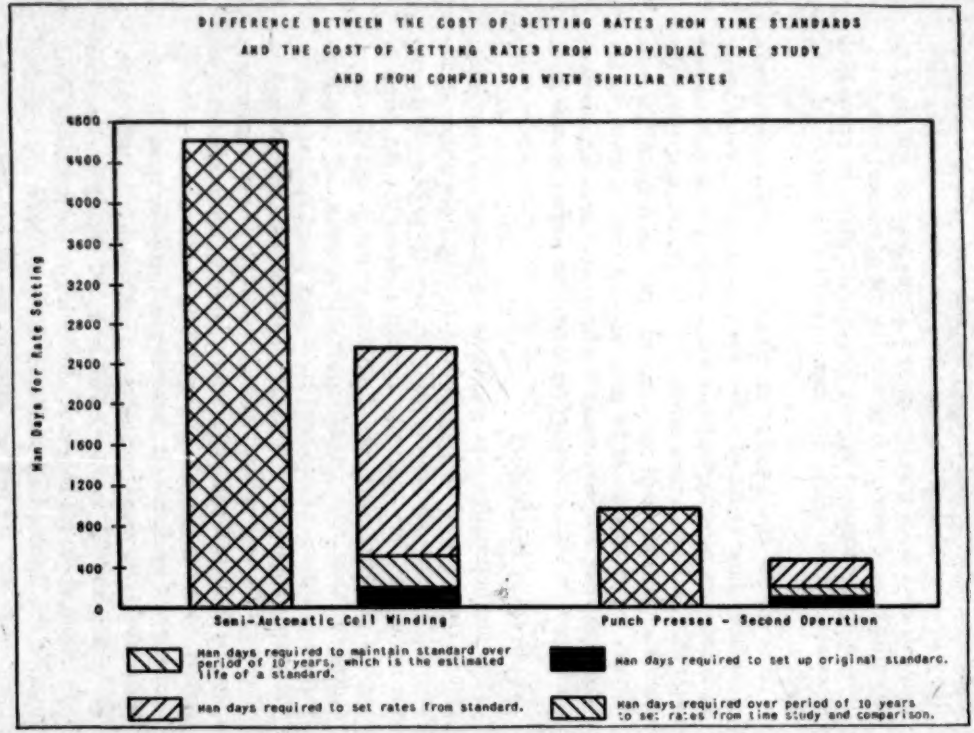
DIFFERENCE BETWEEN THE COST OF SETTING RATES FROM TIME STANDARDS
AND THE COST OF SETTING RATES FROM INDIVIDUAL TIME STUDY
AND FROM COMPARISON WITH SIMILAR RATES
Man Days for Rate Setting
4800
4400
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
Semi-Automatic Coil Winding
Punch Presses - Second Operation
Man days required to maintain standard over period of 10 years, which is the estimated life of a standard.
Man days required to set up original standard.
Man days required to set rates from standard.
Man days required over period of 10 years to set rates from time study and comparison.

EXHIBIT 1

EXHIBIT 1

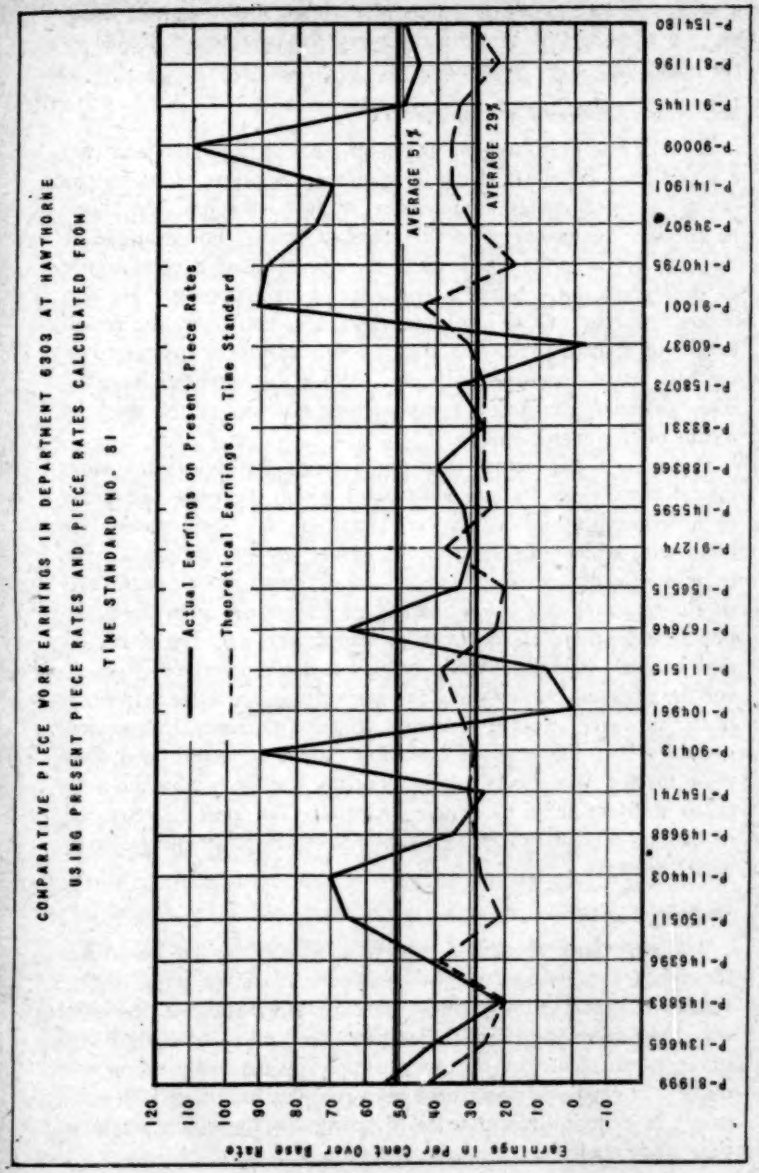

EXHIBIT 2

a very demoralizing effect on the department because there is always a suspicion of favoritism toward the operators assigned to the jobs with "loose" piece rates.

Setting Up Element Time Standards

After it has been decided to set up element time standards for a given class of work, the time standards engineer to whom the job is assigned makes an intensive study of the job. In short, he becomes an authority on this class of work. For example, if the activity to be standardized is the operation of a certain type of drill press, he becomes a specialist on drill presses. He also makes a survey of the job in question, sees that operating conditions are standardized, and that the operators are instructed in the best way to perform the work. When the operators have become proficient, he makes complete time analyses of the work by means of stop watch studies.

Previous to the actual time study work, he divides the work into distinct elements and anticipates which elements will prove to be constants and which variables. He now has material in hand with which to determine the actual laws of variation. He, therefore, transposes the elemental time values from the time study sheets to master data sheets, which are designed to show the variation in conditions of the work in comparison with the respective time values. It is then relatively easy to determine the time values for the constant elements and the more simple variables. In many cases, however, certain elements contain so many independent variables that the laws of variation cannot be determined from these master data sheets. It is therefore necessary to make a detailed study of these particular elements. The most effective way of making this study has been found to be the experimental or research method.

Studying Variables

The experimental method consists of setting up the job so that all variables except one may be held constant while a series of time studies is taken. Then other variables are studied in the same way until complete time studies have been taken over the range of each variable. In this way complete time analyses may be made in a relatively short time on a complex set of variables that would be practically impossible to procure by the usual method of time study analysis.

For example, in the establishment of a time standard for Avey bench drill presses, the time for the element, "drill one hole," was found from the data sheet method of analysis to vary with (1) spindle speed, (2) the kind and size of the drill, (3) the depth of the hole, and (4) the kind of material being drilled. It was obviously impossible to accurately determine how much variation was due to each one of these factors by means of the usual study of the regular run of jobs in the shop. It was therefore necessary to conduct the investigation on an experimental or research basis. It was soon found that for all practical purposes the materials could be grouped under six general classifications. A wide variety of thicknesses of each kind of stock and a complete range of drill sizes were procured and an efficient operator selected to perform the work under observation. The data were then developed by producing conditions whereby all variables except one would remain constant in the following manner: To determine the difference in drilling time due to changes in drill size, a series of holes was drilled of the same depth, with the same spindle speed, and in the same material but with different sizes of drills and the time for each hole was obtained by stop watch timing. The thickness of the stock was then varied while the material, the spindle speed, and the drill size were held constant. This method was continued until complete time studies were obtained which showed the effect a change in any one of these variables has on the time to drill one hole. These time values were checked against values shown on the master data sheet in order to make certain that the conditions of the test study were comparable with normal operating conditions. The data were then charted and complete laws of variation were determined for each of the variables:

The time to drill one hole was found to vary directly with the depth of the hole and inversely with the spindle speed. The feed for drilling holes was found to increase as the drill diameter increased up to the point where the cutting surface of the drill was sufficiently great to diminish the effective feed. Exhibit 3 shows the curves of variation for ⅛" mild steel for the drill sizes and spindle speeds studied. The data points represent the average time values for ten observations.

After the base time units and their laws of variation have been determined as described above, it is generally necessary to establish general allowances to cover miscellaneous porterage, minor

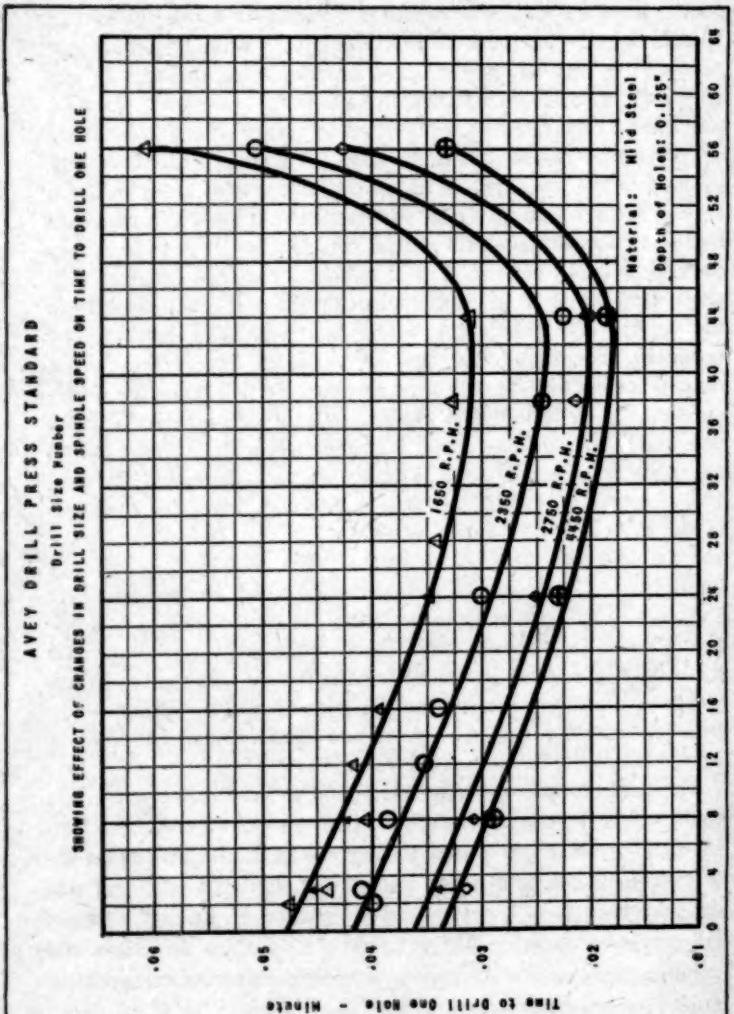
AVEY DRILL PRESS STANDARD
Drill Size Number
SHOWING EFFECT OF CHANGES IN DRILL SIZE AND SPINDLE SPEED ON TIME TO DRILL ONE HOLE
Material: Mild Steel
Depth of Holes: 0.125"
1650 R.P.M.
2250 R.P.M.
2780 R.P.M.
4450 R.P.M.
Time to Drill One Hole - Minute
.06
.05
.04
.03
.02
.01
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64

EXHIBIT 3

machine trouble or attention, interference and delay, cleanup, and the effects of fatigue. These allowances are determined by means of production studies which are, in effect, continuous time studies taken over a long enough period of time to insure a normal representation of these items.

Compilation of the Element Standards

After the time values and their laws of variation have been determined by time study analysis or special experimental studies, and after all necessary allowances have been determined by means of production studies, the engineer develops formulas, charts, and tables so as to present the entire group of time data in a comprehensive form. In integrating the great mass of data he has accumulated, he is guided by two primary purposes; namely, simplicity and general application.

Therefore it is often necessary for him to eliminate certain isolated cases from the standard in order to prevent the complication of the formula. In such cases, it is necessary to decide whether the standard will be of more value with a more complicated formula and more general applicability. In the case of a standard such as a textile winding standard, where few rates are net but the time required to set one rate from individual time study and comparison is great, it is usually advisable to sacrifice simplicity for general applicability. In the case of a standard such as a punch press standard, where the time required to set one piece rate from individual time study and comparison is very small, it is usually advisable to sacrifice general applicability for simplicity.

Checking the Standard

After the engineer has compiled the standard, he makes a thorough check to see that time values derived from the standard will return satisfactory earnings on all rates that may be set from it. This check may be made in two ways. The first method consists of a comparison between the total time given by the standard formulas for given operations and the total times given on the individual time study sheets for those operations after the proper allowances have been added. The second consists of comparing earnings on actual rates in effect (providing an incentive plan is already in effect on the work being covered) with earnings that would have been realized if the rates had been calculated from the

EXHIBIT 3

standard. This is by far the most accurate check of the standard, and shows at a glance whether or not it is satisfactory.

Exhibit 2 shows this comparison for a set of rates calculated from element standards and rates in effect for the operation of Avey bench drill presses. It is self-evident in this case that the standard will return consistent earnings and that these earnings will not vary greatly from the predetermined level. When no rates are in effect, this comparison is made by computing earnings on the rates from output data on day work.

Conclusion

Just as the development of time study technique was a great improvement over the old method of setting rates by estimates, so it is felt that time standardization is an improvement over the individual or isolated time study. At present it is the best available solution for the very perplexing problem of irrational incentive earnings. Ultimately it is hoped that a set of fundamental time standards will be developed which will be universally applicable and from which the time required for most operations may be determined directly and without recourse to individual stop watch timings. Frederick Taylor voiced that hope in 1895; today the nearest we have approached it is in the application of the above plan of element standards.

COMING ARTICLES

In the *N. A. C. A. Bulletin*, November 1, 1947

Variable Budgets in the Control of Costs
by Thomas D. Foy

How We Developed Control of Research and Development Costs
by Glaud L. Smith

A Cost System For a Captive Grey Iron Foundry
by John D. Pawling

CONTROLLING MATERIAL SUPPLY AND INVENTORIES

by B. W. KINDERMAN,
Chief Cost Accountant, DeWalt, Inc.,
Lancaster, Pa.

THE MOST effective way to control the supply of materials and the inventory is to base the entire procedure upon a definite production program developed from sales forecasts. The objective must be to supply production lines and keep them operating without any loss of production and without piling up inventory needlessly and in unbalanced quantities. The ideal condition would be to have little or no raw stock and finished parts inventory, and to have today's receipts of materials go into work in process tomorrow and to have a high turnover of the work in process inventory.

Our company attempts to control the material supply and inventories on such a plan. It must be understood that the present system is not a cure-all and even though it has been in use for four years, there are many improvements still to be made. It is, however, doing a good job with less clerical help in the most difficult times, and has been instrumental in increasing production severalfold. Our business is the manufacture of woodworking machinery (radial type), metal cut-off machinery and the electrical motors used on the equipment of our own manufacture. There are thirty-four sizes in the woodworking line, twelve sizes in the metal cutting line and twenty-one motor frame sizes. The number of different electrical characteristics (voltage, phases, speeds, and frequencies) required all over the world is large. Many of the component parts are interchangeable, some to a greater extent than others.

Control Boards

We have adopted the use of three bulletin boards with black cloth background, ranging in size from 40″ x 60″ to 40″ x 108″, with white letters ¾″ in size with double prongs (Exhibit 1). There are also seven wall panels that are 50″ x 60″ in size, made of ¼″ plywood with small metal hooks, for visual controls. These show at a glance the following:

1. The daily production schedule and monthly totals of machines and motors scheduled for the present and next month.

CONTROL BOARD

COLUMNS 1									1						2	3	4	5	6	7	8	9	10
SEPT	1	2	3	4	5	6	9	3	24	25	26	29	30		SCHD THIS MO.	PROD THIS MO.	TOTAL AUTH' D	TOTAL FACTY	TOTAL BUILT	TOTAL PROC.	FACTY W I PROC.	AUTH 3047	
MODEL	SDBTS	DBTS	DBTS	DBTS	DBTS	DBTS	DBTS	TSDBTS	DBTS	DBTS	DBTS	DBTS	DBTS										MODEL
MACHINES																							
101								23	23	23	23	23	23	traveler yellow	138		1794	1380	1104	690	276	414	101
103	82	82	82	82	82	82	82							traveler green	1150	164	14950	11500	9200	5750	2300	3450	103
MOTORS																							
177															49		637	490	392	245	98	147	177
178															91		1183	910	728	455	182	273	178
180									83	83	48				214		2756	2120	1704	1052	416	636	180
181	12	12									35	83	83		213	12	2743	2110	1696	1047	414	633	181
182	70	68	82	82	82	82	82	11							409	151	5525	4250	3416	2109	8341	275	182
183								71	82						300		4069	3130	2517	1552	613	939	183

EXHIBIT 1

2. The matching of daily performance of actual production of finished units with the schedule.
3. The year-to-date totals of the machines and motors authorized for purchasing, released to the factory, and the total built.
4. The daily balances of total process by model, that is, the total quantity of finished units to be built from all inventories plus purchases made but not yet delivered.
5. The daily balance of factory work in process by model, that is, the total quantity of finished units to be built from finished parts and work in process inventories—all material now on hand.
6. The component parts finished as against the total to be finished by each shop release. (A shop release represents all shop orders to machine the necessary parts required to produce a specified quantity of machines.)

These boards are so located in the office as to be easily accessible to the expediter of purchases, the shop superintendent, the foremen and the sales department. The foremen keep in close contact with these boards, and it takes only a minute for the machine shop foreman to see whether he is keeping pace with the production of the component parts as compared with the production of the finished machines in the assembly department. Likewise, the assembly department foreman can see at a glance how he is matching the schedule. The sales department's interest in these boards is, of course, for the purpose of advising the customers of the shipping dates of their machine orders.

Before adopting the use of these boards, we attempted to maintain our stock of material and parts on a minimum-maximum basis. We frequently changed these minimums and maximums on each item on the basis of anticipated production and the length of time required to get delivery. The tendency was to order in much larger quantities on the "hard to get" items so that they would be on hand when required. The fallacies of this method are that the inventory becomes extremely unbalanced, and that it can not be determined at any given time how many machines and motors can be built with the stock on hand unless each item is carefully tabulated.

Separate boards are used for machines and motors. However,

for illustrative purposes both are included in Exhibit 1. The following explanations are in order:

1. Column 1, Daily Schedule: This example is laid out for the month of September. Only five days a week and twenty days a month are scheduled. The extra work days of the month are used to pick up loose ends, if any exist. Of course, if the schedule has been met production continues on, thus going ahead of schedule, a contingency which has been provided for as explained later. The letters "SD" indicate the number of units scheduled each day and the letters "BT" represent the quantity built or finished each day. These are posted daily.

   There is also another schedule board (not shown) set up in the same way, showing the same information as in this column for the next month, or in this instance, for the month of October. This is done to show the starting assembly dates of the shop releases which have been issued to the machine shop and to the expediters of purchased finished parts so that all necessary parts will be finished and here on time.
2. Column 2, Scheduled This Month: Represents the total machines and motors scheduled to be built in the current month.
3. Column 3, Produced This Month: As units are completed the quantities are changed daily; thus these quantities represent the month-to-date production of the finished motors and machines.
4. Column 4, Total Authorized: The figures in this column represent the total quantity of a given model, whether machines or motors, authorized to be purchased and to be built to date.
5. Column 5, Total Factory: This represents the total "shop orders" issued on all necessary parts for machining and assembling; on Model 101 sufficient to build 1,380 machines. The difference between this column and the "Total Authorized" column represents the quantity on which shop orders must yet be issued. This column, therefore, cannot exceed the "Total Authorized" column as no material has been ordered beyond the authorized quantities.

6. Column 6, Total Built: This represents the number of machines out of the total authorized which have been built to date.
7. Column 7, Total Process: The number represents the remaining quantity to be built of the total authorized. This means that we must have every part that is incorporated into this machine, either in inventory or on order, sufficient to build 690 units in the case of Model 101. At the end of each day, the quantity of machines built for the day is added to the total built and subtracted from this total process quantity. Also note that the totals of columns 6 and 7 must equal column 4.
8. Column 8, Factory Work in Process: Subtracting the "Total Built" from the "Total Factory" represents the "Factory Work in Process"; in the case of Model 101, 276 units. This quantity is also changed at the end of each day, the units built during the day being deducted here the same as in the "Total Process" column. Orders to the shop have been issued and the parts required to build the quantity of machines as shown in this column are either in finished parts inventory or in actual work in process in the factory.

With the use of these bulletin boards we also maintain perpetual inventory records of every raw material and finished parts item. No minimum or maximum quantities are set, as the required quantities of each item are tied in with the balances on the boards.

It is quite simple to check any part at any given time. Parts are withdrawn from stock for assembly, thus reducing the inventory balances, and these withdrawals are in line with the assembly reports, which reduce the process balances of both the total and the factory on the control boards. Therefore if a component part used on Model No. 101 were checked now we would find by adding the inventories of raw stock, finished parts, in process, and the quantity on order with suppliers the total should equal enough to build 690 units, plus a standard allowance for rejects and for service requirements as supplied by the service department. Also, the inventories of finished stock plus work in process should equal enough to build 276 units, plus allowance for rejects and the service requirements. In case of any differential, immediate steps can be taken to bring into balance any item which does not coincide

FROM THE PROPOSED MANUFACTURING SCHEDULE
(For the quarter July, August, and September)

Machine Model	*Motor Frame*	*Units*	*Amount*
103	180	600	$ 180,000
103	181	600	240,000
103	182	1200	360,000
103	183	900	360,000
Total of Machine Model 103		3300	$1,140,000
101	177	150	$ 150,000
101	178	300	450,000
Total of Machine Model 101		450	$ 600,000
Totals		3750	$1,740,000

QUARTERLY PRODUCTION SCHEDULE AS APPROVED AFTER REVISION:

Machine Model	*Motor Frame*	*Units*	*Amount*
103	180	630	$ 189,000
103	181	630	252,000
103	182	1260	378,000
103	183	930	372,000
Total of Machine Model 103		3450	$1,191,000
101	177	144	$ 144,000
101	178	270	405,000
Total of Machine Model 101		414	$ 549,000
Totals		3864	$1,740,000

EXHIBIT 2

with the control as shown on the board. It is, therefore, quite simple to keep the inventory in balance.

Inventories can get out of balance for a number of reasons, such as errors, some of which are bound to occur, variation of rejects from the standard allowances, and variation of the service usage with the anticipated requirements.

Proposed Manufacturing Schedule

A production budget, which is referred to in our company as the "proposed manufacturing schedule," is projected for a period of one year. This schedule is prepared after giving careful consideration to the orders on hand, anticipated sales requirements and trends, and also production capacity. This schedule is approved finally by the board of directors. It provides for minor revisions as between machine models and motors, at the start of each quar-

ter, but every attempt is made to keep the original forecast alive as a general goal.

The proposed manufacturing schedule lists all the machines by sizes, the list prices, and the total volume of business in units as well as in dollars. It is segregated by quarters and also proposes the daily schedule. It is a very important document in our business, for from it the financial, production, sales promotion, and distribution plans are formed.

Quarterly Production Schedule

The planning for production is on a minimum of a four-month basis; that is, for each quarter the schedule is set four months before the first month of the quarter planned. For example, the production schedule for the third quarter (July, August, and September) is planned in March. As previously stated, it is based on the proposed manufacturing schedule, but may be revised, as between models, to keep in pace with the most recent sales orders and trends. Exhibit 2 illustrates how changes may occur as between these two schedules. All references are limited to two machine sizes and six motor sizes and the models, motors, quantities, and amounts are hypothetical.

The breakdown resulting from the release of the quarterly schedule would appear as shown in Exhibit 3. Copies of this schedule are furnished to the production, purchasing, and sales departments. This quarterly schedule is immediately posted to the control board. Referring to Exhibit 1, on p. 202, note that the same quantities are shown in column 9 "Authorized 3Q47" as were approved on the quarterly schedule in the above example. These quantities were also added to the "Total Authorized" and would thereby increase the quantities in the "Total Process" column, since the latter must equal the "Total Authorized" less the "Total Built."

Part Cards

A punched keysort part card is prepared for every finished component part from the bill of materials. A complete set of cards for each machine and motor is maintained. These cards are filed by part number when not in use, for the purpose of quickly showing every assembly in which the part is used. This card contains such information as the name and part number, the quantity required, the drawing number, the pattern number (if any), the size

PURCHASE AND RELEASE SCHEDULE FOR 1947

Machine Model 103 at rate of 82 per day
Machine Model 101 at rate of 23 per day

Dated March 10, 1947

MODEL 103—RELEASE # 75

Purchases scheduled—June 25, 1947 — Traveler tag color
Shop release scheduled—July 1, 1947 — Date frozen
Actual shop release date— — Motors ordered
Scheduled assembly date—Sept. 1 to Sept. 19, 1947 — Freeze to shop
Actual assembly date—

Motor frame	*Machines*	*Service motors*	*Total motors*
180	210	2	212
181	210	1	211
182	420	5	425
183	310	3	313
Totals	1150	11	1161

MODEL 101—RELEASE # 33

Purchases scheduled—July 15, 1947 — Traveler tag color
Shop release scheduled—July 21, 1947 — Date frozen
Actual shop release date— — Motors ordered
Scheduled assembly date—Sept. 22 to Sept. 30, 1947 — Freeze to shop
Actual assembly date—

Motor frame	*Machines*	*Service motors*	*Total motors*
177	48	1	49
178	90	1	91
Totals	138	2	140

The remaining releases are identical with the above except for the dates and would appear in the following order: 103 Release # 76, 101 Release # 34, 103 Release # 77, and 101 Release # 35.

SUMMARY OF SCHEDULE:

Machines		*Motors*	
Model 101	414	Frame 177	147
Model 103	3,450	Frame 178	273
		Frame 180	636
		Frame 181	633
		Frame 182	1,275
		Frame 183	939
Totals	3,864		3,903

EXHIBIT 3

of the material (if not a casting), the kind of material, the weight, and in the case of a change, the release on which it becomes obsolete or the release on which it is first used, whichever the case may be. They can be sorted by part number and selectively sorted by machine, motor, and kind of material. These cards are used to bring the inventory of parts and materials into balance with the control boards, which is done twice a year, also to issue purchase orders and shop releases.

Purchase Orders

The purchase orders are issued from the purchase and release schedule for the total quantities as listed in the summary section, plus a standard allowance for rejects and for service requirements, with releases identified and quantities scheduled for delivery as required by each release. The raw materials are scheduled and expedited so that they will be in the factory on the date shown under "Purchases Scheduled" of the various releases. The finished purchased parts, those on which no processing or machining work is necessary, are scheduled and expedited so that they will be in the factory several days before assembly is scheduled to start for a particular release. No purchase orders are issued for any items beyond this schedule unless written permission has been received from the treasurer of the company, since this affects the planned financial program. Such written authority is made a part of this schedule, and orders of this nature are calculated on the basis of the last quarterly schedule and are scheduled for delivery in the quarter in which the material will be needed. The orders also specify the release model and number for which the material is being ordered. These advance orders must be rescheduled if the next quarterly production schedule is altered from the last one approved.

Shop Releases

Shop orders for machining and processing the necessary parts required for each release are issued and identified by the release number. This is called the "shop release." A traveler tag is issued for each part, and in those cases where more than one skid is required for the same item, a separate traveler tag is issued for each skid load. Every lot or skid load in the shop is therefore identified with a traveler tag. Traveler tags are printed on various colored card stock. Each factory release is assigned a specific tag color to

ease the inside expediting through the shop of the release. The same colored traveler tag is never in the shop on more than one release at any specific time. The shop management has adopted the habit of identifying releases by the tag color. The schedule board displays the scheduled assembly dates of each release, and the tag color of each for the present month and the next month (Exhibit 1 shows only the schedule for the present month, but there is another board containing information as shown in Columns 1, 2, and 3 for the next month). In order that the necessary parts may be machined and processed on time, the foremen themselves do the shop expediting by seeing to it that all the material, identified with the colored tag as shown on the schedule board, is finished and moved out of their department on time. In this way it is not necessary to follow individual parts by part number, but simply the color of the traveler tags. The traveler tag specifies the total number of pieces and a breakdown consisting of the exact quantity required for the release, the standard quantity allowed for rejects, and the quantity required for service. This is very important as the inspection department can spot immediately any excessive loss due to defective material or workmanship and advise the production scheduler, who can immediately take steps to correct this situation in time to eliminate any hold-up in the assembly department. A supplement purchase order is generally issued to pick up such losses. The tags also list all the operations of the part in the sequence in which they are to be performed as well as the machine and department involved for each operation. There are also provided on the line for each operation, spaces for the completion and inspection dates.

Shop Release Dates

The release is forwarded to the shop on the date specified on the schedule, provided the assembly of finished machines is on schedule. The date of the shop release, that is, the date production orders are forwarded to the shop, is a means of controlling the work in process. Suppose, for example, it has been determined that the shop lead time, that is, the time required to produce the finished machine from the date of the shop release, is eight weeks. Assuming that the schedule is 2,000 units in this eight-week period, the shop release would then be forwarded to the shop on the date on which the total of all the machine models of the "Factory Work

in Process" column on the control board would total 2,000 units. The shop releases are therefore kept in line with the assembly. This is the reason that the purchases are scheduled several days ahead of the shop release date, in case production goes ahead of schedule. It is not customary for production to get ahead of schedule as the schedules are purposely established so that they can be made with no little effort. However, it is possible by pressure of customers for delivery of the product and with overtime to produce at a slightly faster rate than scheduled. Therefore, we play safe by purchasing and expediting raw materials ahead of the scheduled shop release date. This is revealed in the example of the "Purchase and Release Schedule" (Exhibit 3). This does tie up cash in some additional inventory, but it is much less expensive than to lose several days production on account of the shortages of materials.

When the shop release is forwarded to the shop it is then posted to the control board. The total quantity of machine units and the motors to be built on the release is added to the quantities in the column "Total Factory" and thereby increases the quantities in the "Factory Work in Process" column by the same amount since "Total Factory" less the "Total Built" equals the "Factory Work in Process."

Production Orders

The production orders of this release are then started through the shop, and as the parts are finished they are put into finished parts stock, posted to the perpetual inventory stock cards in a routine manner, and the traveler tags returned to the office. The tags are then hung on one of the wall panel boards reserved for this particular release on the hook coded for the particular part. Assembly cannot be started on a release until all parts are finished. This means then that all traveler tags must be returned to the office and all hooks of the specific panel occupied with a traveler tag. The shop superintendent and his foremen are quite concerned that all hooks on the particular release panel are occupied as the starting assembly date shown on the schedule board draws near. They know that the front office is watching the scheduled assembly dates as shown on the control boards and also the empty or occupied hooks, as the case may be, on the corresponding panel board.

General Observations and Conclusions

As previously stated, this plan is not a cure-all, but it does a good job in our company. The acquisition of materials is more difficult today than ever, and in spite of this fact our production lines have never been held up because of the lack of materials and our inventories are in balance and are in normal quantities. There are those who object to the idea of large schedule boards marring the walls of an office, but there are, we believe, many offsetting advantages such as the following:

1. A definite planned program or schedule is prominently displayed to all concerned.
2. It acts as a visible up-to-date "ledger account" of each machine and motor to which each component part and material item is posted.
3. It eliminates a tremendous amount of paper work, and it reveals to the executives at a glance up-to-date information concerning production, schedules, purchase commitments, and inventory quantities.
4. Our company, as any organization, is made up of individuals. It is individuals who make the production figures come true. An up-to-date conspicuous report, available to all, from the president to the operators, certainly helps create personal pride and satisfaction in matching the schedule and in many cases actually exceeding it.

COST LINES

Historical reports, however accurate, are not of much value to management unless they point out action that can be taken to improve results. (*O. C. Garner, Reading*)

* * *

It is equally important that the cost accountant should be acquainted with the problems of management. (*H. C. Sheets, Harrisburg*)

COST CONTROL FOR MOTOR CARRIER OPERATIONS

by ALLEN C. KAHL,
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CERTAIN phases of cost control for motor truck carriers are often either overlooked or neglected. Ordinarily the carrier's general books, which contain the balance sheet accounts and the accounts affecting profit and loss, are totaled monthly and appropriate financial statements prepared therefrom. These monthly statements, however, reflect only total operations and usually satisfy management or owner that the business is currently making money and is solvent. For managerial control purposes, these overall figures need to be analyzed. But often, even though a need is felt for more adequate control of operations, lack of personnel or the cost of maintaining additional records prohibits their use. However, this is not necessarily true, and often the posting of additional statistical and cost information can be accomplished by rescheduling the present office routine. This paper will attempt to give a brief description of the records being used by one motor carrier, sources of posting information, accumulation of same, and its use.

Perhaps one of the most important subsidiary records is the "Schedule of Truck Income and Expense" (Exhibit 1). The information contained therein is essential because a motor carrier's "bread and butter" is his rolling stock, and his prime income expectancy and prime operating costs are contingent upon its being operated upon a normal month's mileage of revenue hauls. If any of the equipment fails to meet its expected revenue producing potential, and if none of the other equipment has offset this loss by producing above its expected earning capacity, then a certain percentage of loss must be anticipated. This is predicated upon the theory that all equipment, when utilized at an average rate of revenue miles, is not operating at a loss due to excessive maintenance.

The following columnar headings, not all of which are shown in Exhibit 1, appear on the schedule in addition to the date and customer's name:

1. Miles
2. Weight
3. Revenue
4. Total expenses

SCHEDULE OF TRUCK INCOME AND EXPENSE (BY TRUCK)

Truck No. _____
Driver _____

Date	Customer hauled	(1) Miles	(2) Weight	(3) Revenue	(4) Total expenses	Truck repairs	
	Carried forward						
1							
2							
3							
4							
5							
6							
7							
8							
9							
28							
29							
30							
31							
	Credit following month (Schedule 1)	( )	( )	( )			
	Distribution of accounts payable chgs.						
	Distribution of petty cash purchases						
	Distribution of chgs. from affiliates						
	Distribution of drivers wages						
	Distribution of material requisitions						
	Overhead items directly applicable						
	Total miles						
	Total weight (pounds)						
	Total revenue			$			
	Total expenses				$		

Cost of operation per mile before indirect overhead	(Col. 4 ÷ Col. 1) =	$	
Operating profit before indirect overhead distribution	(Col. 3 — Col. 4) =	$	(A)
Operating profit per revenue miles	(A ÷ Col. 1) =	$	
Operating profit before indirect overhead distribution	(A)	$	$
Other overhead—Applied revenue basis			
—Applied investment basis			
Net operating profit after indirect overhead		$	$

Monthly fixed charges
Average total expenses before other overhead application (Last six months)
Average total expenses after other overhead application (Last six months)

EXHIBIT 1

5. Truck repairs
6. Gas and oil
7. Servicing truck
8. Purchased labor
9. Driver's per diem
10. Other expense
11. Driver's wages
12. Insurance
13. Taxes
14. Depreciation

It is evident that the columns after "total expenses" constitute an analysis of the latter item.

Exhibit 1 also provides a means of accumulating statistical data in an economical manner and provides for a monthly picture of the effects of a given truck's performance for the period. There follows a resume of statistics which can be secured from the schedule.

Cost Per Revenue Mile

It should be of interest to know how much it costs to operate a piece of equipment per revenue mile. Each carrier has at his disposal, either from experience, trade statistics, etc., what is considered a fair rate of truck costs per mile operated with which its actual rate can be compared. This is a feature in cost or budgetary control which we use but to which we shall not give too much attention in this article. A study of this rate over a period of months in which it seems consistently high as compared with the predetermined rate for profit expectancy will reveal one of two faults which need correction: one, the truck has reached the point where it can no longer be operated efficiently and should be replaced, or two, it is not being utilized enough during the period to justify the fixed charges required to keep it in operating condition. These charges occur regardless of the number of miles or hours in use. In arriving at the operating statistics, only those costs directly applicable to the truck are used, and indirect overhead is applied by various means of preparation merely for the purpose of studying its effect on net profit. The added cost of truck mileage after applying indirect overhead can be secured easily enough by dividing the last line on Exhibit 1, "Net operating profit after indirect overhead," by total miles as shown in column 1.

Likewise, in this case, the profit or loss resulting from each truck's operation during the month is of interest and is measured before the application of indirect overhead (that which cannot be directly applied to any particular piece of equipment). This is the fairest measure, actually, of a given truck's performance, since

the other charges accumulating through indirect overhead are incurred irrespective of the number of pieces of equipment or equipment usage. The indirect overhead should be controlled by management itself.

Proration of Indirect Overhead

It is well to take this into consideration, however, in determining its effect upon earnings. But it involves another step, since this indirect overhead should be prorated in several ways to permit of more detailed analysis. One method is based on percentage of revenue earned by all equipment as compared to what each piece of equipment earned, and allows for an accumulation of net profit or loss, after all expenses, by each piece of equipment based on its revenue earned. For this reason, it is preferable to apply overhead, for memo purposes only, on the basis of dollar investment in equipment. This will show the effect on net profit resulting from the application of overhead upon the basis of money invested in equipment, assuming all operating equipment is to share proportionately in earning of revenue. It also provides memo figures for each piece of equipment when it bears its share of administrative and general overhead expenses, and allows comparison of predetermined and actual earning capacity.

Revenue Per Mile

It is also imperative to know the revenue earned per mile, because this will show a variance in rate by trucks which results from differences in freight carried, taking into account both weight and mileage. In other words, some equipment will have gone more miles but the cargo tonnage will have been less, resulting in a lower rate than other equipment with less mileage but greater tonnage and a resulting higher rate. Study will reveal weaknesses in traffic management in planning loads which do not pay. Eventually, a proper standard revenue rate per mile needed to assure the expected net profit will force more effective dispatching of equipment by the proper balancing of weight, mileage, and rates to meet the standard revenue mile of earnings.

Analysis of Total Expenses

An analysis can likewise be made of the amounts which make up the total expense for the months. When operating on a budget, the total expense is established and the various types of expense

are weighted and given standard dollar values or expressed as percentages of total expense. In this way, individual expenses which are out of line can be analyzed as to causes and planned control set up for ensuing periods.

Provision is also made on Exhibit 1 for placing certain information thereon before posting for the month begins. This consists of the monthly fixed charges, the average total direct expenses for the last six months, and the average total expenses for the last six months, made up of direct and indirect expenses, the latter applied on a revenue basis. This information acts as a gauge as to the amount of revenue which must be realized in order to meet the fixed charges. Also, as the month progresses and revenue is recorded and jobs booked, it shows whether total average expenses will be met, and most important, if a profit will be realized. For quick analysis, these figures eliminate the necessity for subtotaling expense columns, or checking unposted data that are accumulated monthly, or referring to fixed charges applicable to equipment. A study of Exhibit 1 will show the make-up of the form, the various posting media (to be described next), and statistics secured therefrom.

Driver's Daily Report

The information to be posted daily to Exhibit 1 is available from the "Driver's Daily Report," a report which is so designed as to include information for miles and weight of cargo being transported, revenue to be realized, and expenses occurring on the trip daily. At the close of a day this report is completed by the driver and mailed to the home office. From information contained therein Exhibit 1 is posted.

The report has a date column which refers to the loading date; it also has space for the customer's name, miles to be hauled, weight of cargo, and amount due from customer. All this information is posted from the driver's report. However, the information as to revenue and statistics is posted only once, when a new customer appears upon the driver's report. If on the last day of a month the driver has any cargo on his truck in transit, a schedule is prepared of these customers and given to the traffic manager who determines the amount to be credited to the following month's revenue, and when so determined, credit is applied to the current month's exhibit and same amount carried forward and posted to next month's exhibit.

Daily and Monthly Postings

From these daily reports, when the truck is on the road, there will be daily postings to expense accounts such as driver's per diem allowances, gas and oil, and quite frequent postings to accounts for truck repairs, servicing truck, and purchased labor. Under the expense column headed "Other" will be posted items for parking, tolls, etc., which are incidental to the total expense. All of these expenses are paid by the driver out of his advances, and the report may very well serve as a posting medium to the general books. In addition to the daily expense posting, there are supplemental monthly entries from the various sources. As expenses are incurred and subsequent invoices are received and recorded in the distribution journal, the invoices directly affecting truck expenses are segregated and the truck number is stamped on them. If more than one truck is affected, proration of amounts applicable to the several truck numbers is shown. A recapitulation of these invoices is made at the end of a month by truck and expense account and posted monthly to Exhibit 1. In a motor carrier operation, this is not the job it might appear, since most expense is incurred on the road and local purchases are from a few particular garages, service stations, or tire dealers.

Likewise, expenditures from petty cash affect truck expense, and the petty cash journal will have to designate the truck or trucks involved and a monthly recapitulation of these items by trucks and expenses will be made and posted.

At the end of every month, settlements from affiliated companies will contain charges for services rendered by them. Since in most cases they affect a particular haul, these charges too will have to be posted to the appropriate truck under proper expense classification.

As the driver's reports are received daily, the accrued wages of the driver (based on mileage) can be determined and posted to the payroll register. Since most drivers use the same truck continuously, totaling of the register for a month's earnings, in most cases, will represent the monthly charge for a driver's wages applicable to given equipment. Proper coding of the register will aid in those cases where drivers or helpers may have worked upon more than one truck in a month.

Other items of expense are for gasoline, tires, or parts taken from the local warehouse and carried in inventory. When this

happens a requisition is prepared and the warehouse foreman indicates upon it which piece of equipment benefited from the receipt of merchandise. A summary of these requisitions for the month then becomes the basis of another entry to Exhibit 1.

The last group of expenses is made up of depreciation, taxes, and insurance which constitute direct charges to equipment. The depreciation schedule furnishes information as to monthly charges by trucks. The amount spent for truck licenses and property tax on the appraisal value of the equipment can be applied directly. The same is true of fleet insurance or insurance policies affecting individual pieces of equipment. Most of these expenses have a year's coverage, hence only one-twelfth or a month's share of the expense is used in posting to Exhibit 1.

Statistical Summary

Exhibit 2 furnishes a means whereby the monthly statistics per truck, as accumulated in Exhibit 1, can be transferred and posted. Each item may be used as a guide showing favorable or unfavorable trends of revenue or cost fluctuations. In each case comparisons of current figures may be made from month to month, year to date, or last year's comparable month to date. Since truck maintenance costs may be spasmodic and one month's cost exceptionally high, year-to-date averages will present a truer pattern if unforeseen truck breakdowns, etc., are experienced in particular months. Better still, our method is to anticipate and set up an estimated yearly charge for truck expense which is accumulated on a year-to-date basis for comparison with actual. Likewise, when forecasting expected truck expense, revenue to be expected is also estimated and used as a year-to-date comparison with actual. Thus information is available at a glance as to which equipment is *not* producing proper profits and the avenues for investigation and correction are indicated.

Monthly Operating Summary

The principal purpose of Exhibit 3 is to display total revenue and expense of the business, to determine the net profit of over-all operation, and to furnish a comparison with the general budget figure. In addition, an average figure for trucking activities may be obtained by dividing total figures by number of trucks. Finally, the accuracy of the posting to each of the truck statistical schedules may be checked by comparing the total truck expenses as used

Schedule of Accumulating Statistics Concerning Truck Income and Expense (By Truck)

Truck No. _____
Driver _____

	January	February	March	Total
Cost of operation per mile before indirect overhead				
Current month				
Accumulative year to date				
Same month last year				
Operating profit per revenue mile				
Current month				
Accumulative year to date				
Same month last year				
Operating profit before indirect overhead distribution				
Current month				
Accumulative year to date				
Same month last year				
Operating profit after indirect overhead distribution				
Current month				
Accumulative year to date				
Same month last year				
Total miles of revenue hauls				
Current month				
Accumulative year to date				
Same month last year				
Total weight of cargo hauled (pounds)				
Current month				
Accumulative year to date				
Same month last year				
Total revenue				
Current month				
Accumulative year to date				
Same month last year				
Total direct expenses				
Current month				
Accumulative year to date				
Same month last year				
Total indirect overhead applied				
Current month				
Accumulative year to date				
Same month last year				

Exhibit 2

SCHEDULE OF ALL TRUCK INCOME AND EXPENSE

	January	February	March	Total
TOTAL REVENUE				
LESS EXPENSE:				
Truck repair				
Gas and oil				
Servicing equipment				
Purchased labor				
Driver's per diem				
Driver's wages				
Other truck expense				
Insurance				
Taxes				
Depreciation				
TOTAL TRUCK EXPENSE				
OPERATING PROFIT BEFORE INDIRECT OVERHEAD				
INDIRECT OVERHEAD APPLIED				
OPERATING PROFIT AFTER INDIRECT OVERHEAD				
INCOME FROM OTHER SOURCES				
LESS: OTHER EXPENSES				
NET PROFIT FROM ALL OPERATIONS				
Cost of operations per mile (Month) (Year to date)				
Operating profit per revenue mile (Month) (Year to date)				
TOTAL MILES REVENUE HAULED (Month) (Year to date)				
TOTAL WEIGHT REVENUE HAULED (Month) (Year to date)				

EXHIBIT 3

in the general records with the total expenses as reflected in Exhibit 3. It also provides a means of reflecting the average over-all cost of operation per truck mile, profit per revenue mile, total miles, and weight of revenue hauls, both by months and year to date.

Income from other sources may, in a trucker's operation, result from warehouse receipts, rental of equipment, and may be generally classified as noncarrier operating revenue. Direct costs of this revenue are applied but indirect overhead expense items are applied to them on an over-all revenue earned basis in conjunction with revenue earned by carrier's equipment in trucking operations. All revenue is, in other words, added together for a 100 per cent total, and the percentage that each type represents of the total determines the rate of indirect overhead applied to each unit of revenue.

To be most effective, these actual statistics should be compared with standards based on revenue and expenses determined in advance. However, whether standards are used or not, careful use and analysis of cost statistics should reveal the following: equipment which is being operated efficiently or inefficiently; cargo revenue hauls that paid or did not pay; total mileage and weight of revenue hauls, and their average per truck as compared to a normal month's expected capacity per truck; differences in like expenses incurred on the road by the drivers, and the opportunity of questioning those which are out of line with the average. Trends, either favorable or unfavorable, relating to revenue or expense items can be observed, and plans formulated for correction of unfavorable tendencies as well as for continuance of the favorable conditions. This constitutes control of equipment costs and the revenue necessary to provide a fair return on investment to the owner or others.

CONTROL PROCEDURES FOR SPECIAL OPERATING SUPPLIES

by JOHN R. HAAS,
Chief of Tax and Audit Section, Hammermill Paper Co.
Erie, Pa.

THE accounting for and physical control over items of operating supplies, repair parts, and construction materials used by a manufacturing company in the ordinary course of operations sometimes present vexing problems to the industrial accountant. This is particularly true where certain of these items are purchased for special use and on a nonrepetitive basis. Generally speaking, operating supplies, repair parts, and construction materials fall into two categories:

1. Items which are continually being used in operations and which are regularly carried in stock.
2. Items such as operating supplies required for the production of special orders, apparatus, machinery, and equipment scheduled for installation by the plant's maintenance and construction crew, and special repair parts.

The items in the first group mentioned above usually present no particular problem. They consist of operating supplies and repair materials normally required to operate the plant and to keep it in proper repair. They are regularly carried in stock in the plant storeroom in varying quantities depending upon requirements, and such quantities are not permitted to fall below specified minimums. Each of these items has a catalogue number and a book inventory of them is maintained in a supplies ledger. They are subject to requisition by the various operating foremen and maintenance crews and the responsibility for physical control of these items is vested in the plant storeskeeper. The items in the second group, however, do not readily lend themselves to the ordinary procedures because of their special and nonrepetitive nature. They therefore call for a distinctive procedure to maintain control over this class of material.

Purchasing Procedure

To begin with, a separate inventory control account for each of the two classes of material is maintained in the general ledger.

For example, an account called Regular Supplies Inventory Control covers those items of operating supplies and maintenance material which are regularly carried in stock, while special items of supplies, maintenance materials, etc., are carried in an account entitled "Special Supplies Inventory Control." The reordering of items of operating supplies and repair materials regularly carried in stock is initiated by the supplies ledger clerk whenever the remaining quantity of any item reaches the specified minimum. Purchase requisitions for special operating supplies or repair materials, apparatus, and machinery and equipment may be issued to the purchasing department by the operating departments, maintenance department, engineering department, or production planning department. The formal purchase order which is prepared by the purchasing department carries on it the name and number of the account to be charged with the purchase. The original copy of the purchase order is issued to the vendor, two copies are retained by the purchasing department and copies are issued to the receiving department and the accounting department. All incoming material is delivered to the receiving department where it is opened and inspected for quality and quantity and a receiving report prepared. Copies of the receiving report are sent to the purchasing department, supplies ledger clerk, and the accounting department.

Receiving and Auditing Procedure

Vendors are requested to show the purchase order number on all shipments of material. This information is usually stenciled or crayoned on the shipping container and permits the receiving clerk to associate the shipment with the purchase order which he has on file. By reference to his copy of the purchase order, the receiving clerk determines the category into which the incoming material falls. If it is an item of regular supplies (the purchase order would show the catalog number of the item), it is delivered to the plant storeroom where the material is stored in its proper bin. The supplies ledger clerk enters the receipt of the material in the supplies ledger, using his copy of the receiving report as the basis for the entry. Vendor's invoices for regular supplies are routed to the supplies ledger clerk for posting to the supplies ledger.

If by reference to his copy of the purchase order the receiving clerk determines the incoming shipment to be an item of special supplies, he immediately fills out a special supplies requisition

form. This requisition form is serially numbered and is exactly the same as a regular supplies requisition except that it is of a different color and consists of an original and duplicate copy. The original copy is printed on ordinary-weight paper and the duplicate is printed on tag stock which has a piece of wire attached to it. In preparing this requisition form the receiving clerk indicates the date on which the material was received, the purchase order number under which it was ordered, a brief description of the material, and the quantity received. The tag (duplicate copy of the requisition form) is then attached to the material before it is delivered to the plant storeroom. The original copy of the special supplies requisition is sent to the supplies ledger clerk where it is filed by purchase order number in an "open file."

An extra copy of the receiving report is prepared for items of special supplies and is sent to the department which initiated the order for such item. This acts as notification to the department that the special item has been received and is available for use.

When invoices are received from vendors they are audited for mathematical accuracy, compared with the proper receiving report to ascertain receipt of the material covered by the invoice, and compared with the purchase order as to quantity, quality, price, terms, freight allowances, if any, etc. The name and number of the account to be charged are entered on the invoice. The invoices are then entered in the accounts payable register. Invoices for items of regular supplies and special supplies are then routed to the supplies ledger clerk. As previously mentioned, the supplies ledger clerk enters the vendors' invoices for regular supplies in the supplies ledger. Vendors' invoices for special supplies are used by the supplies ledger clerk to price the special supplies requisitions in his open file.

Withdrawal Procedure

When items of special supplies are withdrawn from the plant storeroom for use, the tag is removed from the material, and, in lieu of a requisition, the tag is signed by the individual withdrawing the material, the date of withdrawal, and the department or work order number chargeable is entered on the tag. The tag is then sent to the supplies ledger clerk, who removes from his open file the original copy of the requisition, enters the date of disbursement and department or work order chargeable thereon, and for-

wards it to the cost department for cost distribution purposes. The total value of special supplies thus distributed to the various departments and work orders is credited to the special supplies inventory control account. At the end of any month the balance in this account should be equal to the total value of special supplies requisitions remaining in the supplies ledger clerk's open file. The latter also constitutes a book inventory record of special supplies on hand in the plant storeroom and may serve as the basis for periodic physical inventory checks. After using the tags as the basis for releasing the original copies of special supplies requisitions, the supplies ledger clerk then returns the tags to the plant storeroom where they are kept on file for possible future reference.

In the event that the supplies ledger clerk receives the special supplies requisition tag prior to the receipt of the vendor's invoice, he merely attaches the tag to the original copy until the vendor's invoice is received and the requisition is priced. However, in reconciling his open file with physical inventories of special supplies, these items must be taken into consideration.

The above approach covers only the basic procedures involved. They are relatively simple and require no unusual amount of paper work. By refining or expanding certain phases of these procedures, they can be adapted to particular circumstances and collateral internal procedures.

POINTS OF VIEW

These companies were reluctant to adopt a system of perpetual stock control . . . It was believed that a satisfactory system required . . . both dollars and quantities. Just why . . . is a mystery to the writer. (*R. D. Anderson, Boston*)

* * *

The internal auditor must be able to view and consider all matters coming to his attention . . . with the same interest, understanding, and independence as management itself. (*A. Matz, Philadelphia*)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946.

Of N. A. C. A. Bulletin, published semimonthly at New York, N. Y., for Oct. 1, 1947, State of New York, County of New York ss.

Before, me, a Notary Public in and for the State and county aforesaid, personally appeared R. P. Marple, who, having been duly sworn according to law, deposes and says that he is the Editor of the N. A. C. A. Bulletin and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, National Association of Cost Accountants, 385 Madison Ave., New York 17, N. Y. Editor, R. P. Marple, 385 Madison Ave., New York 17, N. Y. Managing Editor, none. Business manager, Arthur B. Gunnarson, 385 Madison Ave., New York 17, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) National Association of Cost Accountants, 385 Madison Ave., New York 17, N. Y. President, Mason Smith, A. T. Kearney & Co., 135 S. LaSalle St., Chicago 3, Ill. Assistant Secretary, Arthur B. Gunnarson, 385 Madison Ave., New York 17, N. Y. Assistant Secretary, R. P. Marple, 385 Madison Ave., New York 17, N. Y. Treasurer, Philip J. Warner, The Ronald Press Co., 15 E. 26th St., New York 10, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is.....(This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

R. P. MARPLE,
Editor.

Sworn to and subscribed before me this 29th day of September, 1947.
(Seal)

IRVING I. STEINHOLTZ,
Notary Public, New York County,
N. Y. Co. Clk's No. 728, Reg. No. 939-S-6.
Commission Expires March 30, 1948.